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PHALLODRILINAE (OLIGOCHAETA: TUBIFICIDAE) FROM THE EAST COAST OF FLORIDA, WITH DESCRIPTION OF A NEW SPECIES OF *ADELODRILUS*

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Abstract.—Four species of the subfamily Phallodrilinae are reported from subtidal coarse sands off Hutchinson Island, Florida. Taxonomic notes are given for *Peosidrilus biprostatus* Baker and Erséus, *Phallodrilus sabulosus* Erséus, and *Phallodrilus* sp. *Adelodrilus acochlearis* n. sp., distinguished from previously known *Adelodrilus* by its lack of "giant" penial setae, is described.

The Phallodrilinae Brinkhurst, 1971 comprise the most species-rich subfamily within the marine Tubificidae. Previous taxonomic accounts of Phallodrilinae from the east coast of Florida have been published by Erséus (1979a, b, c, 1980), using a collection from the Miami area. This report is based on specimens which were collected at Hutchinson Island by personnel of Applied Biology, Inc. during oceanic sampling funded by Florida Power and Light, Co. (cf. Gallagher and Hollinger, 1977). One of the species found is new to science; two others are new to the Florida fauna.

Sand samples taken with a Shipek grab were fixed in the field with 10% buffered seawater formalin. The worms were sorted from sieved fractions of the samples. Microscopical studies were made on whole specimens mounted in resin. Material of all species but *Phallodrilus* sp. has been deposited at the United States National Museum of Natural History (USNM), Washington, D.C., and at the Museum of Zoology, Louisiana State University (LSU), Baton Rouge, Louisiana.

Peosidrilus biprostatus Baker and Erséus, 1979

Peosidrilus biprostatus Baker and Erséus, 1979:506–508, figs. 1–2.

Material examined.—USNM 64618 (3 spms), and LSU 3146 (3 spms), all from off Hutchinson Island, Florida, 27°19.1′N, 80°13.2′W, seaward margin of beach terrace about 0.5 km from shore, 8.2 m depth; very coarse calcareous sand (collectors, Gallagher *et al.*; 12 Dec. 1976).

Remarks.—*Peosidrilus biprostatus* was previously known only from New Jersey and North Carolina (Baker and Erséus, 1979). This new record thus extends its known distribution considerably.

The new specimens are 5.7–7.0 mm long, and they consist of 44–57 segments, which on average is shorter than the specimens described from New Jersey and North Carolina (6.9–9.5 mm, 54–62 segments). The somatic setae are slightly more numerous in the new material, generally 4–5 per bundle throughout the body (3–4 per bundle in the original material). The penial setae count 4–11 per bundle, on average fewer than in the original material (7–13 per bundle). The penial setae are slightly larger, up to about 50 μm long, in the new material (only 30–37 μm in original individuals). With the exception of these small differences, the worms fit the original description very precisely.

Habitat.—Sublittoral, medium to very coarse sands, known from 5.5–73 m depth.

Distribution.—Florida (new record), North Carolina and New Jersey (all NW Atlantic).

Phallodrilus sabulosus Erséus, 1979
Fig. 1A

Phallodrilus sabulosus Erséus, 1979b:188–189, figs. 1–2.

Material examined.—USNM 64619 (2 spms), and LSU 3148 (2 spms), all from off Hutchinson Island, Florida, 27°22.9′N, 80°13.9′W, a trough that parallels the shoreline, about 11 m depth; poorly sorted, coarse to very coarse calcareous sand (collectors, Gallagher *et al.*; 12 Dec. 1976).

Remarks.—Previously, only two specimens of this species were known and described (Erséus, 1979b). The type-locality is close to Miami, Florida, and thus the new record is not very remarkable from the zoogeographical point of view. However, the new material adds valuable information on the morphological variation of the species.

The only complete specimen is 6.1 mm long and consists of 61 segments (the only complete type-specimen was 5.5 mm, 44 segments). There are up to 5 bifid setae per bundle in anterior segments (maximally 4 in the type-material), and up to 4, occasionally 5, setae per bundle in segments posterior to the clitellum (maximally 3 in the types).

The very characteristic penial setae (Erséus, 1979b:fig. 2) are present in all the new specimens; always one seta at each male pore, and they are about 60 μm long. The spermathecal setae (op. cit.:fig. 2) are located in segment X in three of the four new worms, in IX in the fourth individual. This variation in location of the spermathecal setae was already obvious in the type-material (op. cit.:189), but, in the new material, the number of spermathecal setae varies, too. There is not always only one seta at each side of the worm; in two specimens there is an extra spermathecal seta, giving bisetal bundles at one side, unisetal "bundles" at the other side of the segment.

The type-specimens were mature, but not post-copulatory, and thus their

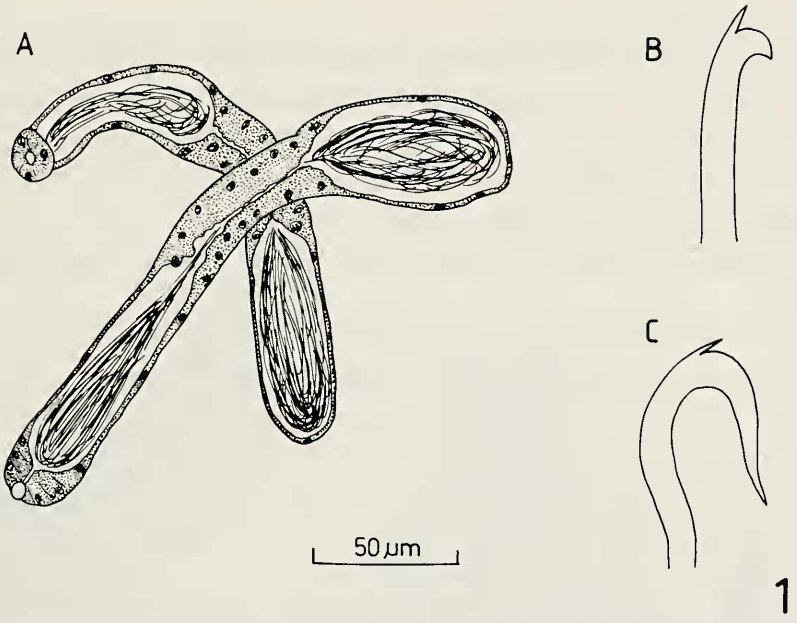

Fig. 1. *Phallodrilus sabulosus*: A, Spermathecae, as seen in oblique view of a whole-mounted specimen. *Adelodrilus acochlearis*: B, Free-hand drawing of anterior, somatic seta; C, Free-hand drawing of posterior, dorsal, somatic seta.

spermathecae were not quite fully developed (cf. op. cit.:fig. 1). In the new material, however, two specimens have sperm in their spermathecae, which now can be more accurately described (Fig. 1A). The spermathecae are 190–225 µm long, maximally 27–38 µm wide, and each consists of a slender, duct-like outer part, and an inner oval ampulla. Sperm are present in random masses, both in the dilated outer portion of the ducts, and in the very thin-walled ampullae.

Habitat.—Sublittoral coarse sands, known from 3–11 m depth.

Distribution.—Florida (NW Atlantic).

Phallodrilus sp.

Material examined.—Four specimens from off Hutchinson Island, Florida, 27°20.7′N, 80°12.8′W, shallow trough about 0.6 km W of southern tip of Pierce Shoal, 11 m; coarse sand (collectors, Whiting *et al.*; 3 Mar. 1977).

Remarks.—These specimens are very similar to *Phallodrilus leukodermatus,* described from Bermuda by Giere (1979), but the status of the new material will have to be discussed in context with other *Phallodrilus* worms from the Caribbean area (Erséus, in prep.).

Adelodrilus acochlearis, new species
Figs. 1B–C, 2

Etymology.—Derived from Latin "cochleare" (spoon); an *Adelodrilus* species "without spoons" (i.e. without giant penial setae).

Holotype.—USNM 64616.

Type-locality.—Off Hutchinson Island, Florida, 27°21.6′N, 80°13.2′W, shallow trough midway between beach terrace and Pierce Shoal, an offshore bar, about 11 m depth; coarse to very coarse calcareous sand, with some shell fragments in granule class and minute amounts of silt and clay (collectors, Whiting *et al.*; 10 Sept. 1976).

Paratypes.—USNM 64618 (5 spms), and LSU 3147 (3 spms), all from the type-locality.

Description.—Length (fixed specimens) 2.5–3.3 mm, 30–37 segments. Diameter in whole-mounted, slightly compressed specimens: 0.11–0.16 mm at segment V, 0.15–0.20 mm at clitellum, 0.06–0.10 mm posteriorly. Prostomium large, more or less spherical. Clitellum thin, extending over ½X–XII. Somatic setae all bifid, 3–5 per bundle anteriorly, 3–4 (occasionally 2 or 5) per bundle posteriorly. Anterior dorsal setae, and all ventral setae with upper tooth shorter and much thinner than lower tooth (Fig. 1B). In dorsal bundles of most posterior segments, a large proportion of setae aberrant (Fig. 1C), with lower tooth extremely long, curved downwards, and ectal tip that parallels the setal shaft; upper tooth short and thin, very similar to upper teeth of the "normal" setae. Bifids 45–62 μm long, 1.5–2.5 μm thick at node. Ventral setae of XI modified into penial bundles (Fig. 2, ps), each of which consists of about 8–12 (exact number difficult to establish) straight setae in a more or less circular formation. Penial setae 30–50 μm long, 0.5–1 μm thick at middle, entally slightly thicker, ectally with small "club" bearing apical hook. Ectal ends of penial setae protruding into small copulatory sacs (Fig. 2, cs), one posterior to each atrial opening. Male pores paired, in posterior part of XI, located in line with ventral somatic setae. Spermathecal pores paired, located laterally in anterior-most part of X.

Pharyngeal glands poorly developed. Male genitalia (all structures paired) (Fig. 2): vas deferens (vd) dilated, appears muscular, most probably devoid of cilia (not established for this species, but a common feature of the genus); vas longer than atrium, convoluted and appears filled with sperm; vas entering pear-shaped atrium slightly sub-apically; atrium (a) 58–71 μm long, 35–43 μm wide, clearly divided into two histologically different portions; ental atrial portion with granulated and ciliated inner epithelium, whereas ectal portion neither granulated nor ciliated, but appearing very stiff and swollen, probably due to vacuolization of large cells of inner epithelium; outer atrial lining of muscles very slender, maximally about 1 μm thick; outer tip of atrium pointed and protruding through opening of small copulatory sac (cs); two prostate glands present, one (pr 1) entering atrium at junction between vas and atrium, another (pr 2) attached to middle, posterior face of atrium. Spermathecae (Fig. 2, s) consisting of short ducts and slender ampullae. Ampullae 90–130 μm long, of varying width (maximally 33–44 μm), but often wider entally than ectally and sometimes with con-

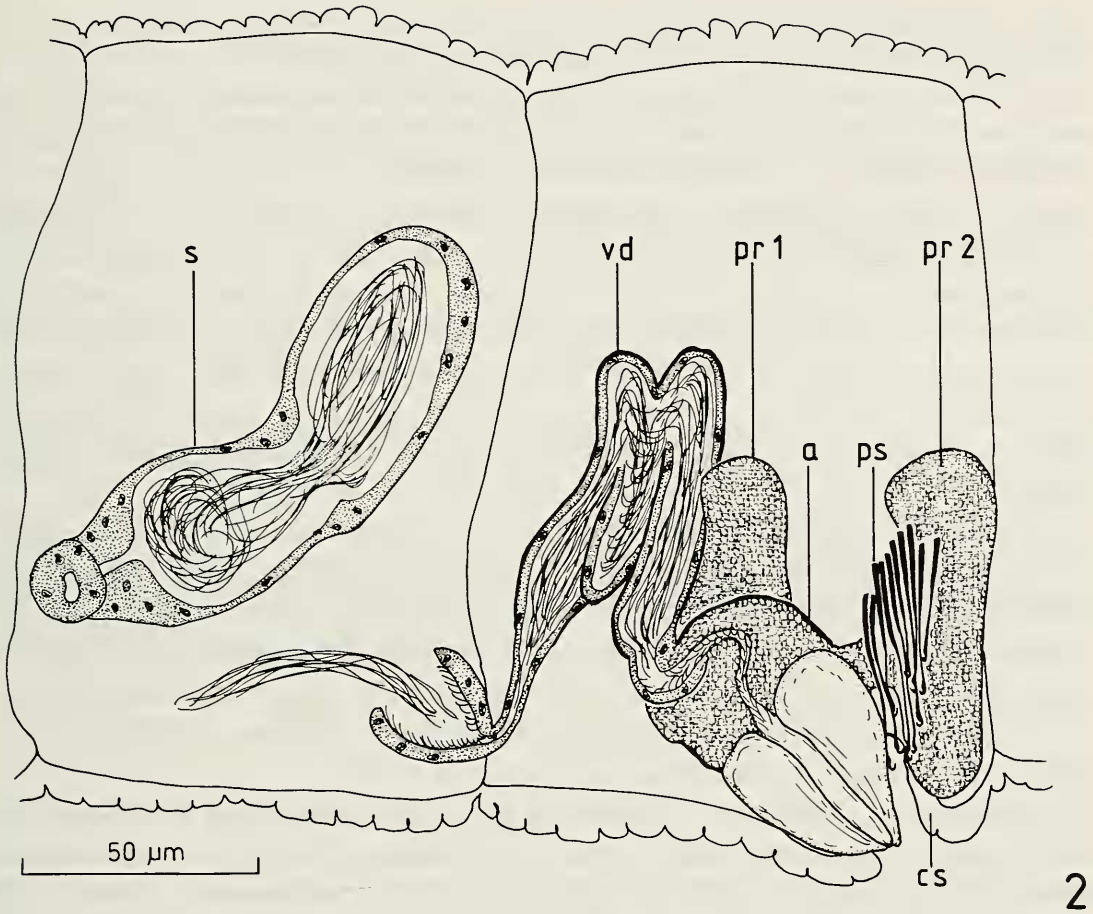

Fig. 2. *Adelodrilus acochlearis*: Lateral view of genitalia in segments X and XI. a, atrium; cs, copulatory sac; pr 1, anterior prostate gland; pr 2, posterior prostate gland; ps, penial setae; s, spermatheca; vd, vas deferens.

striction at their ectal-to-middle part. Sperm in random masses in spermathecae.

Remarks.—*Adelodrilus acochlearis* n. sp. is unique within *Adelodrilus* with regard to three main characters (for comparisons with other *Adelodrilus,* cf. Erséus, 1978, 1979d): (1) It lacks the "giant" penial setae, which characterize the modified setal bundles at the male pores of all congeners (cf. Discussion). (2) It possesses a type of dorsal, posterior setae (Fig. 1C) which is not known for any other member of *Adelodrilus*. (3) Its atria are histologically bipartite (Fig. 2, a), all other species have atria that are uniformly granulated and ciliated along all of their lengths.

Habitat.—Sublittoral very coarse sand, 11 m depth.

Distribution.—Known only from the type-locality (Florida, NW Atlantic).

Discussion

When the generic definition of *Adelodrilus* was discussed by Erséus (1979d), great taxonomic importance was ascribed to the "giant" penial

setae, structures that characterize all previously known members of the genus, and which are believed to aid in sperm transfer (op. cit.). Still, of course, the occurrence of these large setae in most species certainly supports the view that *Adelodrilus* is a monophyletic, very homogeneous group of marine tubificids. However, the new species, *A. acochlearis,* somewhat weakens this homogeneity. The absence of "giant" setae in *A. acochlearis* is probably linked with the evolution of the bipartite atria, in which the ectal part has become swollen, stiff and pointed, and which probably has taken over the role of introducing sperm into the spermathecal opening of the concopulatant; there is no longer a functional need for the "giant" setae. In the closely related, monotypic genus *Bermudrilus* Erséus, 1979, this evolution has apparently gone farther; true penes are developed (cf. Erséus, 1979d).

All these facts would support the lumping of *Adelodrilus* and *Bermudrilus* if it were not for the prostate glands: in *Bermudrilus,* there is only one anterior pair of prostates, and no posterior glands as in *Adelodrilus*. We therefore conclude that the new species *acochlearis* should be placed in *Adelodrilus,* and that *Bermudrilus* should be kept apart from *Adelodrilus*.

The generic definition of *Adelodrilus* given by Erséus (1978) does not need to be revised to include *A. acochlearis* n. sp.

To date, five species of *Adelodrilus* have been described from the U.S. east coast: *A. anisosetosus* Cook, 1969 (Massachusetts), *A. voraginus* (Cook, 1970) (deep sea off Massachusetts), *A. magnithecatus* Erséus, 1979 (N. Carolina), *A. multispinosus* Erséus, 1979 (New Jersey), and *A. acochlearis* n. sp. (Florida).

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